

Application No. 10/749,059  
Amendment "B" dated April 2, 2006  
Reply to Office Action mailed January 9, 2006

### REMARKS

Applicant expresses appreciation to the Examiner for the further interview conducted with applicant's representative. At the interview, previously presented independent claims 23 and 24 were reviewed and discussed in view of the prior art of record, especially the Gordon reference, which is the primary reference upon which the current rejections of record are grounded.

As discussed with the Examiner, the independent claims 23 and 24 and depending claims 2, 4 - 11 and 14 - 16 are presented for reconsideration in view of the arguments and points noted. Minor amendments to the specification have been made to correct a typographical error, and claims 2 and 15 have been amended to correct dependency and to improve clarity of terms with respect to antecedent basis for terms contained in those claims based on the correct claim dependency. In particular, claim 15, which was rejected under 35 U.S.C. § 112 second paragraph, has been amended to make it clear that the insulating layer referred to claim 15 is the same as that referred to in claim 24. Accordingly the rejection of that claim is overcome by the amendment.

In the Office Action, the claims were rejected under 35 U.S.C. § 103(a) as obvious in view of U. S. Patent Publication US 2002/0133970 (Gordon et al.), or as obvious over Gordon et al. as combined with either U. S. Patent Publication US 2003/0081430 (Becker)<sup>1</sup> (cited as teaching the use of an insulating air gap between the heat sink and casing), or U. S. Patent No. 5,213,103 (Martin et al.) (cited as teaching an epoxy containing heat conducting particles).

As defined in the independent claims, applicant's dental curing device is comprised of an elongated housing having a proximal end and a distal end, with a handle portion disposed between the proximal and distal ends. A light source is disposed at the working tip located at the distal end of the housing, and electronic circuitry is disposed within the handle portion of the housing for controlling the light source. A heat sink is disposed within the elongated housing for transferring heat generated by the light source away from the light source located at the working tip of the distal end and for then dissipating the heat that is transferred away from the light

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<sup>1</sup> As stated in the last response, Becker qualifies as "prior" art, if at all, under 35 U.S.C. § 1-2(a). Applicant continues to reserve the right to challenge whether Becker is a proper qualifying reference, and thus any remarks or arguments in respect to Becker should be understood as being made simply assuming for purposes of the argument that Becker is a qualifying reference.

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source. The heat sink comprises "a first elongated solid metallic portion having proximal and distal ends, with the distal end in thermal contact with the light source and extending from the light source through at least a portion of the elongated housing." The heat sink also comprises "a second elongated portion comprised of a polymer-based material that is not electrically conductive, with the second portion in thermal contact with the first elongated solid metallic portion at its proximal end, and the second elongated portion extending through the handle portion of the housing and surrounding at least a portion of the electronic circuitry contained therein."<sup>2</sup>

The claimed structure of applicant's heat sink for the dental curing device advantageously conducts heat quickly away from the light source by virtue of the elongated solid metallic first portion. The heat is then effectively dissipated by the elongated second portion, located in the handle. The elongated second portion of the heat sink is placed in the handle and surrounds the electronic circuitry because it is a polymer-based material that is not electrically conductive. This effectively improves the heat dissipation characteristics of the overall heat sink structure. In effect, the first metallic portion rapidly conducts heat away from the light source so that the working tip or end of the light curing device, which is used in and around a patient's mouth and soft tissue, does not become too hot and likely to hurt or injure the patient. The second portion of the heat sink, in the handle, then dissipates the heat.

As claimed, this is in distinct contrast to the prior art of record. As noted in the Interview Summary, "It was pointed out that Gordon specifically states that in the embodiment shown in Fig. 10 rather than utilizing the conductive epoxy, metal is used, and therefore, . . . it is not obvious to change the location of the element." As further noted in the Interview Summary, it was also argued that "even if the foregoing were not true, combining the two embodiments would result in a device opposite from the claims because the epoxy would be situated toward the light emitting end, not in the handle as claimed." Thus, reconsideration of the claims and allowance over the prior art of record is respectfully requested.

Gordon et al. discloses two different embodiments of a heat sink for a dental curing device. In one of the embodiments (see Figs. 7 – 9) the dental curing device includes a thermally conductive heat transfer element 208 (Figs. 8 – 9). A heat sink 214 (Fig. 9) consists of a

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<sup>2</sup> Independent claim 24 is similar to claim 23 and additionally adds an insulating layer that surrounds the first elongated solid metallic portion.

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thermally conductive molded material such as an epoxy that surrounds a metallic heat transfer element 208 in the space between the metallic heat transfer element 208 and outer tube 204.

This structure does not anticipate or make obvious applicant's heat sink structure, as claimed. Applicant's claimed structure does not include a first metallic heat transfer element surrounded by an epoxy heat sink. Rather, applicant's claimed structure includes "a first elongated solid metallic portion having proximal and distal ends, with the distal end in thermal contact with the light source and extending from the light source through at least a portion of the elongated housing, and a second elongated portion comprised of a polymer-based material that is not electrically conductive, with the second portion in thermal contact with the first elongated solid metallic portion at its proximal end, and the second elongated portion extending through the handle portion of the housing and surrounding at least a portion of the electronic circuitry contained therein." Thus, in applicant's claimed structure the first or metallic portion is situated adjacent, or next to, the epoxy portion so as to be in thermal contact at the ends that abut one another. Gordon et al.'s heat sink has the first portion or heat transfer element 208 surrounding the second or epoxy portion 214, all of which is contained in the outer tube 204 that is operatively used in the patient's mouth. No part of the heat sink in this embodiment is in the handle, but rather is located near the operative portion used in the mouth, which is not desirable and contrary to applicant's device, which moves the heat away from the operative portion to the handle portion. Moreover, the metallic portion is surrounded by the polymer-based material, unlike applicant's claimed invention in which the metallic part of the heat sink is located at the working end of the curing device in contact with the light source for rapid heat transfer away from the light source, and a second epoxy portion located in the handle (not surrounding the metallic heat sink).

The second embodiment of Gordon et al. discloses (Fig. 10) an alternative heat sink arrangement 314 which consists of a metal body joined to the opposite end of heat transfer element 208. As noted, nowhere does Gordon et al. teach that the structure of these embodiments is interchangeable. Indeed, in the first instance, the disclosure treats these embodiments as *separate and distinct* alternatives to one another, stating that "*Rather than utilizing a thermally conductive epoxy that surrounds heat transfer element 208 (e.g., rather than using the first embodiment), heat sink 314 includes a metal (or other thermally conductive*

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material) body joined to the opposite end of heat transfer element 208 as mount 210." Page 4, ¶ [0044] (Bracketed statement and emphasis added).

At most, Gordon et al. discloses that "While heat sinks 214 and 314 are shown used exclusively of each other in the depicted embodiments, it will be appreciated that heat sinks 214 and 314 may also be used together in a single curing system." Id. at ¶ [0045]. But even this fails to anticipate or make obvious the claimed invention. This would simply result in a light curing device in which the tube 204 that constitutes the working tip of the device would have a metallic heat transfer element 208 surrounded by the epoxy heat sink 214 in the tube or working tip, and a metallic heat sink portion 314 in the handle portion. This arrangement, even if adopted, would be essentially opposite to applicant's claimed light curing device, as noted above. And clearly there is no motivation or suggestion to alter or interchange the placement of the metallic heat sink 314 with the epoxy heat sink 214. Indeed, doing so would make no sense in the context of Gordon et al. since then the metallic heat sink 314 would constitute yet a further layer of metal surrounding the already metallic "heat transfer element" or inner tube 208.

In short, any notion that one of skill in the art would logically be led to interchange the epoxy heat sink 214 of Fig. 9 that is configured to surround the metallic heat transfer element 208 for the metal body 314 of Fig. 10 that is located in the handle portion, in a way that would produce the structure claimed by applicant, ignores the specific teaching of Gordon et al. as noted, and is born more out of hindsight reconstruction than anything contained by way of suggestion to do so taught by Gordon et al.

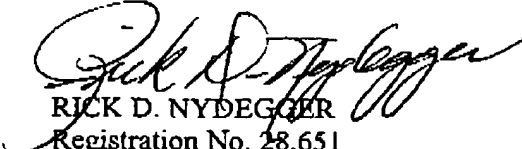
For at least the foregoing reasons, the claims are neither anticipated nor made obvious by Gordon et al., either singly or in combination with any other reference of record. Accordingly, favorable reconsideration and allowance is respectfully requested.

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In the event the Examiner finds any remaining impediment to allowance that may be clarified through a telephone interview, the Examiner is requested to contact the undersigned attorney.

Dated this 4<sup>th</sup> day of April, 2006.

Respectfully submitted,

  
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